REMARKS

Entry of this Preliminary Amendment before continued examination of the instant application is respectfully requested. Upon entry of this Preliminary Amendment, claims 1-13, 15-18, and 34-48 remain in the application. Reconsideration of the claims is respectfully requested.

Claims 1, 5, 7-13, 34, 40-44, and 48 have been amended to correct minor typographical errors and/or to improve the readability of the claims.

Claims 34-37, 39-44, 46, and 47 stood rejected (in the Final Office Action of February 21, 2007) under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as being obvious over Sasahara (U.S. Patent Publication No. 2002/0012825). With regard to independent claim 34, the Examiner stated that Sasahara teaches a method of making nanoscale catalyst patterns, comprising:

i) providing a malleable membrane having a top surface;

iii) forming one or more nanoscale recesses in the membrane, each recess having a bottom and side walls between the top surface of the membrane and the bottom of the recess; and

iv) depositing a layer of catalytic material on the top surface of the membrane and the bottom of the recesses.

The Examiner recognized that Sasahara does not explicitly teach a mold having nanoscale protrusions and pressing the protrusions into the membrane. The Examiner concluded, however, that Sasahara teaches ***embossing*** to produce impressed features having nanoscale dimensions, and it would have been inherent that a mold having nanoscale protrusions was used because the embossed surface would substantially replicate the size of the embossments used. Alternatively, the Examiner stated that it would have been obviously desirable to vary the size of the protrusions in view of Sasahara's teaching to vary the imprint size.

Applicants respectfully disagree with the Examiner's conclusion that Sasahara anticipates independent claim 34 or, in the alternative, renders claim 34 obvious in view thereof. Claim 34 recites, in part, "***imprinting*** the at least one nanoscale protrusion into

the membrane...." An imprint is "[a] concavity in a surface produced by pressing" ("Imprint," *WordNet® 3.0*, retrieved April 3, 2007, from http://dictionary.reference.com/browse/imprint). Fig. 3C of Applicants' application as filed depicts the formation of one or more concavities (i.e., the recessed features 26) that are impressed into the membrane 24 via imprinting (paragraph [0030] of Applicants' specification as filed). During formation of the recessed features 26, the material conforms to the shape of the protruding features in the mold (paragraph [0030]), and thus substantially no material is removed from the membrane 24. Furthermore, the recessed features 26 are ***impressions***, not protrusions, formed into the membrane 24.

In sharp contrast, the method in Sasahara employs a micromachining technique categorized by material removal, material addition, net-shaping, and deformation (paragraph [0050]). The material removal and material addition techniques set forth in Sasahara are different from Applicants' invention as defined in claim 34, because material is neither removed nor added in the Applicants' claimed method. Furthermore, the net-shaping technique disclosed in Sasahara is accomplished via direct casting, injection molding, screen printing, dip coating, or sol-gel processing; and the deformation technique is accomplished via embossing, blow molding, centrifuge, or autoclaving (paragraphs [0052]-[0053]). *None* of these net-shaping or deformation micromachining techniques include, or even suggest, *imprinting*.

The Examiner asserts that embossing is essentially the same as imprinting, because the features produced substantially replicate the size of the embossments used. One skilled in the art would be cognizant of the fact that embossing is a method used 1) to cause something to bulge out or to become protuberant (emboss. (n.d.), *Dictionary.com Unabridged (v 1.1)*, retrieved April 7, 2007, from Dictionary.com website: http://dictionary.reference.com/browse/emboss) or 2) to raise the surface of into bosses (www.webster.com/cgi-bin/dictionary). As such, it is submitted that one skilled in the art would know that embossing is not the same as imprinting, and that one skilled in the art would NOT be led to replace an embossing technique (which forms protrusions) with an imprinting technique (which forms recesses).

Further, claim 34 provides that the ***nanoscale*** protrusions are imprinted into the membrane. In sharp contrast, Sasahara teaches (in paragraph [0039]) forming three-dimensional features in interfaces 38, 40 having a width between "5 and 500 μm," and a depth between "1 μm and 5 min [sic]." Sasahara further states that "[t]his range of feature size is typically referred to as mesoscale. Any nanoscale surface area ***enhancement*** within the catalyst-loaded interfaces 38, 40 ***supplement*** the area enhancement is the mesoscale range." This is also clearly shown in Fig. 8 of Sasahara. Sasahara does **not** form nanoscale features in the interface 38, 40 and, therefore, is clearly distinguishable from claim 34.

As provided hereinabove, the Examiner asserts that it would be obvious to one skilled in the art to vary the size of the protrusions in view of Sasahara's teaching to vary the imprint size. However, Sasahara teaches that the mesoscale features are suitable for reactant flow, and that nanoscale features are suitable for enhancing the surface area of the mesoscale features. Applicants submit that one cannot conclude, based on the teachings of Sasahara, that nanoscale features (which enhance surface area) are suitable for reactant flow. As such, it is submitted that replacing the mesoscale sized protrusion with a nanoscale sized protrusion is not taught or suggested by Sasahara.

For all the reasons stated above, it is submitted that Applicants' invention as defined in independent claim 34, as well as the claims depending ultimately therefrom, is not anticipated, taught or rendered obvious in view of Sasahara, and patentably defines over the art of record.

Claims 1-13 and 15-18 stood rejected (in the Final Office Action of February 21, 2007) under 35 U.S.C. § 103(a) as being unpatentable over Sasahara in view of Chou (U.S. Patent No. 5,772,905). The Examiner recognized that Sasahara is silent with regard to providing a mold having one or more nanoscale protrusions pressing into the membrane to form recesses having a lateral dimension ranging from 1 nm to 100 nm, where each recess has a top surface, a bottom surface, and sidewalls. The Examiner further stated that Chou teaches a mold having one or more nanoscale protrusions pressing into a

membrane to form recesses having a lateral dimension of 25 nm, which would implicitly have a top surface, bottom surface, and sidewalls. The Examiner concluded that it would have been obvious to incorporate the method of Chou into that of Sasahara because 1) Sasahara clearly suggests that fabricating with machining techniques provides the advantages of fine resolution and high repeatability, and that the second pattern may have a prescribed pattern, and 2) Chou provides a micromachining technique having fine resolution and high repeatability, and the ability to provide a prescribed additional pattern which could be varied to achieve any desirable roughness.

Applicants have amended claim 1 to include steps for forming the mold used to form the nanoscale recess(es). Support for this recitation may be found throughout the specification as filed, particularly in paragraphs [0019] – [0022] and in original claim 32.

Sasahara does not teach or suggest forming a mold, and using the mold to form recesses in a membrane. Although Chou discloses a mold patterned with features including pillars, holes, and trenches with a minimum lateral feature size of 25 nm, the mold is patterned using electron beam lithography, reactive ion etching, or the like (Column 4, lines 39-42). Chou does not disclose forming the mold by establishing at least a portion of a masking element on at least a portion of the mold, and then etching exposed portions of the mold to form the nanoscale protrusions.

Based on the amendment to claim 1 and all of the reasons provided hereinabove with respect to Sasahara and Chou, it is submitted that the invention as defined in amended claim 1 is not taught, anticipated, or rendered obvious in view of Sasahara and Chou, either alone or in combination, and patentably define over the art of record. Claims 2-13, and 15-18 depend ultimately from claim 1. It is also submitted that, through this dependency, Applicants' invention as defined in these claims also is not anticipated, taught or rendered obvious by Sasahara and Chou, either alone or in combination, and patentably defines over the art of record.

Claims 38, 40, 45, and 48 stood rejected (in the Final Office Action of February 21, 2007) as being unpatentable over Sasahara in view of Chou. For the reasons provided hereinabove in conjunction with independent claim 34, from which claims 38, 40, 45 and

48 ultimately depend, it is submitted that these claims are not taught, anticipated, or rendered obvious in view of Sasahara and Chou, either alone or in combination, and patentably define over the art of record.

In summary, claims 1-13, 15-18, and 34-48 remain in the application. It is submitted that, through this amendment, Applicants' invention as set forth in these claims is in a condition suitable for allowance.

Further and favorable consideration is requested. If the Examiner believes it would expedite prosecution of the above-identified application, he is cordially invited to contact Applicants' Attorney at the below-listed telephone number.

Respectfully submitted,

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